REMARKS

By the present amendment, the specification and drawings have been amended to improve their presentation. In addition, independent claims 1 and 11 and dependent claims 2 and 8 have been amended to obviate the examiner's objections thereto and/or to further clarify the concepts of the present invention. Claims 1-15 are pending. Entry of these amendments is respectfully requested.

In the Office Action, the drawings were objected to as not showing all of the features being claimed. Specifically, it was alleged that the drawings fail to show the "grooves" as recited in claims 14 and 15.

In response, Figure 1 of the drawings has been amended to include the numeral 14 for the two grooves. Additionally, lines 15-17 of page six of the specification have been amended to read as follows:

> "In the case of the inlay cladding structure, it is necessary to pre-fabricate grooves 14 in the base material for inlaying the metal strips 12 and 13."

Accordingly, withdrawal of the objection to the drawings is requested.

Independent claim 11 and dependent claim 15 were rejected under 35 USC § 102(b) as being anticipated by the patent to De Vries. In addition, independent claim 11 and dependent

claims 12 and 13 were rejected under 35 USC § 102(e) as being anticipated by the patent to Szwarc et al. In making each of these rejections, it was asserted that the cited patents teach the entire structure as set forth in the independent claim including the shape of the resistor body and the electrodes being inlaid in a groove. Reconsideration of these rejections in view of the above claim amendments and the following comments is respectfully requested.

Before discussing the subject rejection in detail, a brief review of the presently claimed invention as defined by amended claim 11 and the claims dependent thereon may be quite instructive. Claims directed to the low resistance value resistor having inlaid metal strips as set forth in independent claim 11 were presented after an interview in the parent application where it was indicated that a claim directed to the embodiment shown in Figure 1 might be allowable. Specifically, it was understood that it was the combination of the "bent" configuration for the resistor in combination with the recessed metal strip 12 behind a "ear" or "projection" on the resistor body that might be patentable. It is submitted that the low resistance value resistor having inlaid metal strips as is now set forth in independent claim 11 is not taught or suggested by the cited patent to De Vries or the patent to Szwarc et al.

More particularly, with regard to the De Vries patent, it is submitted that a somewhat strained interpretation of prior claim 11 was resorted to in alleging that the claim is anticipated by the resistor shown in Figures 1 and 2 of the patent. By the amendments herein, claim 11 has been amended to further distinguish over the teachings of this patent. It is submitted that the resistor according to the De Vries patent does not have, among other things, a ribbon resistor body in the shape as claimed nor electrodes of metal strips as claimed which form a clad structure.

As to the cited Szwarc et al patent, it is submitted that the resistor defined by claim 11 distinguishes over the structures shown in Figures 1 and 2 of the patent. Among other things, the resistor shown in the Szwarc et al patent does not have a resistor body of a ribbon shape having two end portions extending a plane, and a central portion extending in at least one plane which is parallel to and different from the plane of the end portions. Further, the conductive pins 16 alleged to be equivalent to the metal strip electrodes as claimed are not inlaid in a groove to form a clad structure and are not such that a surface of each metal strip and a surface of the each end portion lie in a common plane.

For the reasons stated above, withdrawal of the rejections under 35 U.S.C. § 102(b) and 102(e) and allowance of claims 11-13 and 15 as amended over the cited patents are respectfully requested.

Dependent claim 15 was also been rejected under 35 USC § 102(e) as being anticipated by, or under 35 USC § 103(a) as being unpatentable over, the patent to Szwarc et al alone or in combination with the patent to Smejkal et al. Further, dependent claims 12 and 14 were rejected under 35 USC § 103(a) as being unpatentable over the patent to De Vries in view of the patent to Person et al and dependent claim 13 has been rejected under 35 USC § 103(a) as being unpatentable over the patent to De Vries in view of the patent to Smejkal et al. Reconsideration of these rejections in view of the above claim amendments and the following comments is respectfully requested.

The above remarks relative to the teaching deficiencies of the De Vries and the Szwarc et

al patents are reiterated herein with regard to these rejections of claims 12-14. It is submitted that the same considerations as were discussed previously regarding possible distinctions of independent claim 11 over the first two cited patents would also be applicable to these rejections. As to the subject matter of claim 15, the considerations as set forth below relative to claim 1 are applicable.

For the reasons stated above, withdrawal of the rejections under 35 U.S.C. § 102(e) and 103(a) and allowance of claims 12-15 over the cited patents are respectfully requested.

Independent claim 1 and dependent claims 4-9 were rejected under 35 USC § 103(a) as being unpatentable over the patent to Smejkal et al in view of the patent to Person et al. In making this rejection, it was asserted that the Smejkal et al patent teaches the entire structure as set forth in the independent claim with the exception of the recitation as to (1) the resistor body thickness and (2) perhaps the straight path. The patent to Person et al is then asserted to supply each of these teaching deficiencies. Reconsideration of this rejection in view of the above claim amendments and the following comments is respectfully requested.

Before discussing the subject rejection in detail, a brief review of the presently claimed invention as defined by amended claim 1 and the claims dependent thereon may be quite instructive. The low resistance value resistor as claimed is exemplified by the embodiment shown in Figure 6 of the present specification. This low value resistor has, among others, two unique features which distinguish the resistor from that disclosed in the above two cited patents.

More particularly, one feature of these low resistance value resistors is that the resistor has a precisely controlled resistance value (for example, less than several milliohms (mΩs) and a tolerance of ±1%). Such a low value resistor can be produced by trimming to the precisely controlled resistance value by varying at least a thickness or a width of the resistor body uniformly along longitudinal direction of the resistor body as is set forth on page 3, line 22 to page 4, line 16 of the subject specification.

The subject resistor has a straight and uniform current path formed in the resistor body between the electrodes. With this straight current path structure for the resistor, the inductance value of the resistor can be minimized, thus resulting to a resistor having precisely controlled low resistance value and having low inductance value. The minimized low inductance value provided by the straight current path shows excellent electrical characteristics (low effective inductance) as shown in FIG. 10B of U.S. Patent No. 6,798,189, resulting in good consistency between voltage waveform and current waveform as shown in FIG. 1OA of the same. If there is a trimming cut of vertical direction in the longitudinal direction of the resistor body, the trimming cut causes the current path bent by vertical trimming cut, then effective inductance is increased as shown in FIG. 11B of the same, resulting to a large inconsistency between voltage waveform and current waveform as shown in FIG. 11A of the same. (See column 9 line 38 - column 10 line 39). Thus, according to the present invention, a resistor having precisely controlled low resistance value and having minimized low inductance value, which shows excellent electrical characteristics as a current detecting resistor, can be obtained.

Another feature of the presently claimed low resistance value resistor is wide flat top surface

of the resistor body 710 (FIG. 6), which is produced by forming a fused solder layer only on lower surface of the electrodes. There are several distinct advantages of having the fused solder layer on only the lower surface of the electrodes.

More specifically, first, since the resistor 700 of the present invention has the fused solder layer on only the lower surface of the electrodes 721 and 722 and no fused solder layer on side surfaces of the electrodes, solder fillets are not formed around the side surfaces of the electrodes when the resistor is mounted on a circuit-board. In other words, the resistor 700 is bonded to the circuit-board only at the lower surface of the electrodes 721 and 722. Therefore, the required space for mounting the resistor is minimized comparing to those having solder layers on side surfaces resulting in solder fillets formed around the side surfaces, and mountable density on the circuit-board can be increased according to the resistor 700.

Second, the solder layer can be coated without the presence of any encapsulating material. Conventionally, resistors are solder coated after encapsulating material is coated on those portions where the solder layer should not be formed, that is, the applied encapsulating material functions as a mask for the subsequently applied solder. Therefore, without the necessity for using encapsulating material as a mask, manufacturing process can be shortened and simplified.

Third, the entire top surface of the resistor 700 has a wider flat surface and thus the whole top surface of the resistor 700 can be used for marking and the like. It is submitted that the cited patents to Smejkal et al and Person et al do not teach or suggest a low resistance value resistor as claimed nor the advantages and features thereof.

More particularly, the Smejkal et al patent discloses, as is shown in FIG. 5 and in column 3, lines 43-48, trimming cuts 54 and 56 of a vertical direction in the longitudinal direction of the resistor body 34, which causes the current path through the body to be bent, that is, to be other than straight. The Person et al patent discloses, as is shown in FIG. 7 and in column 4, lines 47-51, trimming cuts 36 of a vertical direction in the longitudinal direction of the resistor body 34, which causes the current path through the body to be bent, that is, to be other than straight.

Thus, with regard to the first feature of the subject invention as discussed above, the patents to Smejkal et al and Person et al do not teach or suggest the straight and uniform current path structure, in which a resistance value of the resistor is trimmed to have high precision of resistance value by varying a thickness or a width of the resistor body uniformly along longitudinal direction of the resistor body. In other words, these patents do not teach or suggest low resistance value resistor as claimed where the resistor has a precisely controlled resistance value produced by trimming to the precisely controlled resistance value by varying at least a thickness or a width of the resistor body uniformly along longitudinal direction of the resistor body.

The Smejkal et al patent discloses, as is shown in FIG. 7A, solder coating 66 and 68 both on the upper surface of the resistive element materials 28 and lower surface of the conductive materials 30 and 32. The Person et al patent discloses, at FIG. 8 and column 5, lines 1-3, terminals 14 and 16 which comprise plated conductive material coated over the ends of resistance element 12. Thus, with respect to the second feature of the present invention as discussed previously, the Smejkal et al and Person et al patents do not teach or suggest a resistor where the fused solder layer on only the lower surface of the electrodes and the advantages to be obtained

thereby. These patents teach resistors having solder layers on side surfaces. Therefore, the required space for mounting the resistor is not minimized as in the presently claimed invention. Also, the resistors according to the Smejkal et al and Person et al patents are solder coated after encapsulating material is coated other than portions, where the solder layer should not be formed. Additionally, the top surface of the resistor according to the Smejkal et al and Person et al patents does not have a wide flat surface available for marking and the like.

For the reasons stated above, withdrawal of the rejections under 35 U.S.C. § 103(a) and allowance of claims 1 and 4-9 over the cited patents are respectfully requested.

Dependent claims 9-10 were rejected under 35 USC § 103(a) as being unpatentable over the same patent to Smejkal et al in view of the patent to Person et al further in view of the patent to Rainer. In addition, dependent claim 2 has been rejected under 35 USC § 103(a) as being unpatentable over the patent to Smejkal et al in view of the patent to Person et al further in view of the patent to Shindo et al and dependent claims 2 and 3 have been rejected under 35 USC § 103(a) as being unpatentable over the patent to Smejkal et al in view of the patent to Person et al further in view of the patent to Takeuchi et al. In the former rejection, it was asserted that the Rainer patent teaches the defined epoxy coating. In the latter two rejections, it was asserted that the Shindo et al and Takeuchi et al patents teach the defined solder thickness and solder materials. Reconsideration of these rejections in view of the above claim amendments and the following comments is respectfully requested.

The above remarks relative to the teaching deficiencies of the Person et al and the Smejkal

et al patents are reiterated herein with regard to these rejections of claim 1. It is submitted that the same considerations as were discussed previously regarding possible distinctions of independent claim 1 over the first two cited patents are also applicable to these rejections. It is submitted that the patents to Rainer, Shindo et al and Takeuchi et al do not supply these teaching deficiencies.

For the reasons stated above, withdrawal of the rejections under 35 U.S.C. § 103(a) and allowance of claims 2, 3 and 9-10 over the cited patents are respectfully requested.

In view of the foregoing, it is submitted that the subject application is now in condition for allowance and early notice to that effect is earnestly solicited.

In the event this paper is not timely filed, the undersigned hereby petitions for an appropriate extension of time. The fee for this extension may be charged to Deposit Account No. 01-2340, along with any other additional fees which may be required with respect to this paper.

Respectfully submitted,

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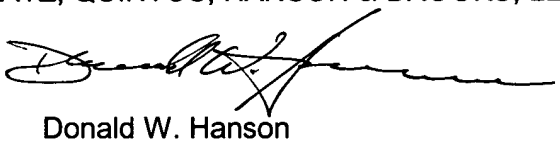

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IN THE DRAWINGS:

Figure 1 has been amended to include the numeral 14 to identify grooves. An annotated marked-up drawing as well as a Replacement Sheet are attached herewith.

FIG. 1

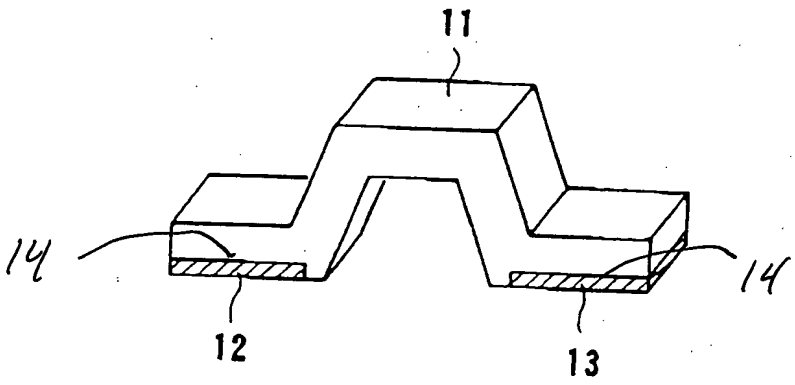

FIG. 2